

***Turanana mystica* spec. nov. - a new lycaenid from the Great Caucasus**

(Lepidoptera, Lycaenidae)

by

DMITRY V. MORGUN & VALENTIN V. TIKHONOV

received 16.X.2010

Abstract: *Turanana mystica* spec. nov., a new lycaenid species from the east of the Greater Caucasus (the territory of the Republic of Daghestan, Russian Federation) is described.

The genus *Turanana* BETHUNE-BAKER, 1916 includes about 12 species, widespread in Central Asia and Middle East. The most eastern species inhabits North-Western Himalaya, and the most western species is known from the Southern Balkans. All species inhabit arid mountain regions where they can be found at low altitudes, on stony slopes covered with sparse xerophytic vegetation. The type species of the genus is *Lycaena cytis* CHRISTOPH, 1877 (TSCHIKOLOVETS, 1997). The northernmost populations from *Turanana* were firstly found in the region of the Inner Daghestan (Northern Caucasus, Russian Federation) in 2003, and reported in several papers such as *T. endymion* (FREYER, [1850]) (MORGUN, 2004; LVOVSKY & MORGUN, 2007) occurred in Transcaucasia. The recent original investigation shows some apparent morphological differences of Daghestan imagines. Besides, these populations differ by their biological peculiarities. These characters allow us to describe a new species from the Northern Caucasus Mountains.

***Turanana mystica* spec. nov.**

Holotype ♂, Russia, Daghestan, Andiyskoe Kojsu river, left bank, Tantari, SW slopes of Salatau, 475 m (42°45'49" N, 46°38'47" E), 4.VII.2010, TIKHONOV, V. V. leg. (col. pl. 6: 2).

Allotype ♀, Russia, Daghestan, Tchirkata, 450 m (42°47'14" N, 46°42'56" E), 30.VII.2007, TIKHONOV, V. V. leg. (col. pl. 6: 6).

Paratypes (4♂, 8♀): 1♂, Russia, Daghestan, Tloch (42°68'82" N, 46°48'45" E.), 26.VII.2003, TIKHONOV, V. V. leg. (fig. 1; col. pl. 6: 3); 1♂, Russia, Daghestan, Tchirkata, 450 m, 6.VI.2010, TIKHONOV, V. V. leg. (col. pl. 6: 1); 1♂, Russia, Daghestan, Tchirkata 450 m, 15-17.07.2009, ILYINA E. V. leg. (col. pl. 6: 5); 1♂, Russia, Daghestan, Andiyskoe Kojsu river, Tantari, 5.VI.2010, 475 m, TIKHONOV, V. V. leg. (col. pl. 6: 4); 1♀, Russia, Daghestan, Tloch, 26.VII.2003, TIKHONOV, V. V. leg. (col. pl. 6: 7); 1♀, Russia, Daghestan, Tchirkata, 450 m, 30.VII.2007, TIKHONOV, V. V. leg.; 3♀, Russia, Daghestan, Andiyskoe Kojsu river, Kunzakh environments (42°44'43" N, 46°38'57" E), 5.06.2010, TIKHONOV, V. V. leg. (fig. 1; col. pl. 6: 7, 9, 10); 3♀, Russia, Daghestan, Tchirkata, 450 m, 6.VI.2010, TIKHONOV, V. V. leg. (col. pl. 6: 8).

The holotype and the allotype are in the Zoological Institute of Russian Academy of Science (Saint-Petersburg), two paratypes (♂, ♀) are in the Zoological Museum of the Lomonosov Moscow State University (Moscow). One paratype (♀) is in the Darwin State Museum (Moscow). The other paratypes are in the D. V. MORGUN (Moscow) and the V. V. TIKHONOV (Pyatigorsk) private collections.

Description: The forewing length is 9 mm in the holotype, 7.5 in the allotype, 7.5-10.5 mm in ♂♂ and 7-10 in the ♀♀ paratypes.

Holotype ♂: The wing upperside is very dark violet, with a broad black marginal border averaging about 1.6 mm wide. The narrow black discal spot is obvious. The violet area continues behind the discal spot. The veins on the hind wing upperside are black on the violet ground color. The fringe in the middle and anal part of the fore wing is dark brown, and at the apex is whitish. The underside is grayish brown with olive tint. The forewing has two lines of brown marginal stripes and 6 prominent large black spots in submarginal area, bordered with white circles. The fourth submarginal spot is big and displaced to the marginal border. The hindwing is with two lines of marginal markings. Between these markings there are a number of whitish dots. The ochraceous rubiginous small spot in anal angle is not bright and poorly expressed. The submarginal irregular line includes 8 small black spots. The discal spots of the fore- and hindwings are narrow and oblique. In the basal part of the hindwing there are 2 small black points. The grayish dusting or blue, shiny suffusion in the basal area of the hindwing is not expressed. The fringe is dark on the underside. The antennae are black with narrow white lines and the white spot on the top (col. pl. 6: 11).

In the ♂ the foreleg femur - 1 mm, tibia - 0.8 mm, tarsus - 0.9 mm, without any spines.

♂ genitalia: The ♂ genitalia are very small (1.2 mm long, about 0.9 mm high). The tegumen is oval with thick bristles; the uncus is short and blunt. The gnathos arms are short with blunt apices. The yuxta is V-shaped, with slender arms. Valva in general is elongate, rather wide in medial part and bean-shaped, with rounded apical part, with the thick indumentum on the apex, costal and hind margins, without big teeth or protuberances but with slightly expressed 6 small thorns on inner costal margin, which are reduced in some male paratypes. These thorns are not equal in size (the third and the fourth slightly longer than the other). The length of the valva varies from about 0.8 to about 1.2 mm, proportionate to overall size of the butterfly. Aedeagus is short, blunt and wide, shorter than valva (fig. 3).

Allotype ♀: The upperside is very dark brown, without any prominent spots or suffusion. The discal spot is shown through the underside. The underside is light brown with the same combination of characters as in the males. The circles around the black spots are mainly light gray. The fringe is dark. There is no prominent grayish or bluish suffusion in the basal area of the hindwing (col. pl. 6: 12).

Variation: The variation is expressed in the ♂♂ by their overall size (forewing length from about 9.0 mm to 10.5 mm. On the underside it is expressed mainly by the extent of pale orange spot in the anal angle in both sexes. The upperside of ♀♀ varies from blackish to dark brown. At the distal edge of valva number of thorns varies from 5 to 6, in some specimens they are almost reduced (col. pl. 6: 1-10).

Distribution: Three populations have only been found in the Inner Mountain Daghestan at the right and left bank of Andiyskoe Kojsu River near Tloch, Tchirkata and Tantari on the south-eastern slope of Salatau Range (fig. 1). They are obviously separated from the closest known populations of *T. endymion* (FREYER, [1850]) in Azerbaijan by ranges of the Great Caucasus in the High Mountain Daghestan. It is a single representative of the genus *Turanana* in the Northern Caucasus Mountains either in Russian Federation.

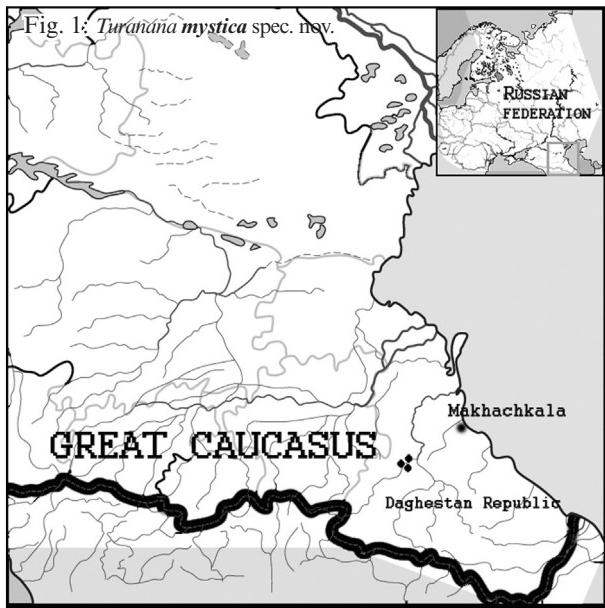


Fig. 1: Map of *Turanana mystica* spec. nov. localities (● indicating as in the map).

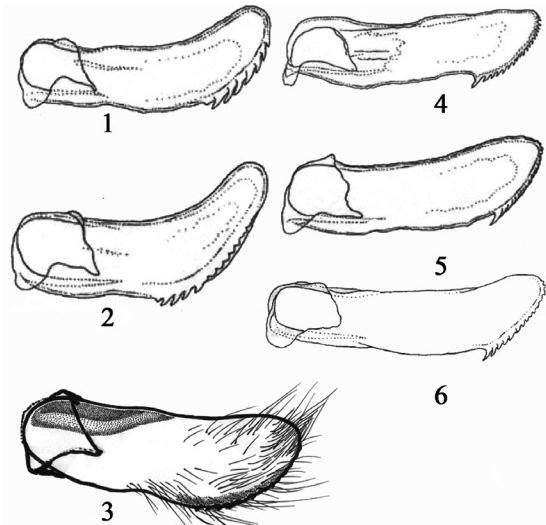


Fig. 2: Right valva in the ♂ genitalia of *Turanana* species complex.
 (1) *T. e. endymion* (FREYER, [1850]), neotype; (2) *T. e. ahaversos* (BYTINSKY-SALZ & BRANDT, 1937), lectotype; (3) *T. mystica* spec. nov., holotype; (4) *T. taygetica taygetica* (REBEL, 1902), neotype; (5) *T. t. micrasiatica* COUTSIS, 2006, holotype; (6) *T. t. endymionoides* COUTSIS, 2005, holotype.
 1-2, 4, 6 - by COUTSIS, 2005. 5 - by COUTSIS, 2006. 3 - original image.

Biology and ecology: The imagines fly in small narrow dry gorges and stony mountain slopes with very sparse xerophytic vegetation, mainly represented by the *Paliurus spina-christi* MILL. Bushes (col. pl. 6: 13, 14 a-c). The imagines fly with *Tarucus balcanicus* (FREYER, [1844]) at the stony sites without any plants at 450-800 m above sea level. The imagines were observed from the early June till the late July in prolonged emergence. The butterfly is very rare. The possible food plant is *Limoniopsis overinii* (Boiss.) LINCZ., Plumbaginaceae (= Limoniaceae) found in the type locality (col. pl. 6: 15).

Etymology: “Mystica” in Latin means “mysterious”. The specimens of this butterfly are very rare and difficult to find in the type locality due to their quick and low flight and their ability to hide in the background soil.

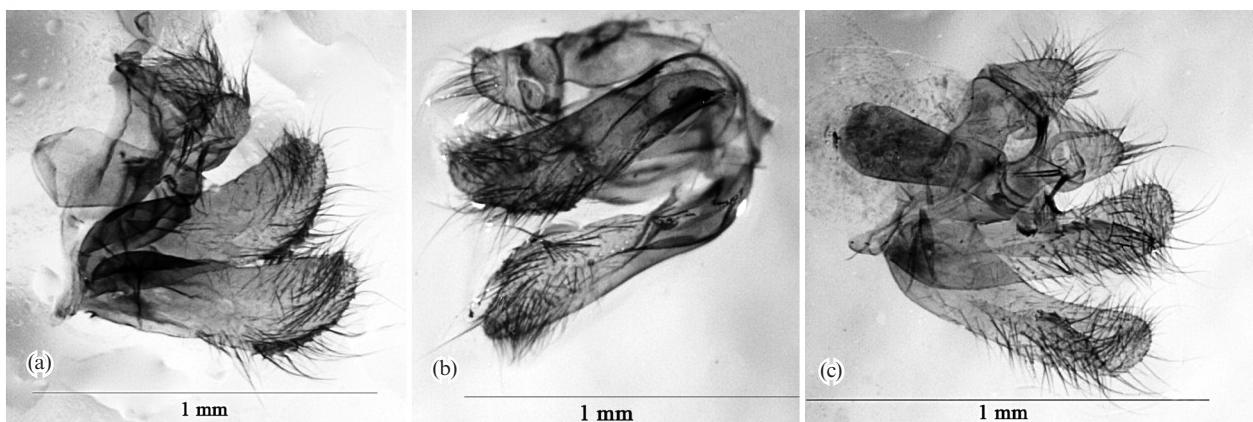


Fig. 3: *Turanana mystica* spec. nov., ♂ genitalia. (a) holotype genitalia, lateral view; (b) paratype genitalia (Russia, Daghestan, Tchirkata 450 m, 15.-17.VII.2009, ILYINA E. V. leg.), lateral view; the distal margin concaves inward; (c) paratype genitalia (Russia, Daghestan, Andijskoe Kojsu river, Tantari, 5.VI.2010, 475 m TIKHONOV V. V. leg.), dorsal view.

Diagnosis: *Turanana mystica* spec. nov. differs from the closest species complex *T. endymion* (Fr.) by darker upper and undersides of the wings having a dark purple hue in the ♂. The underside of the *T. mystica* spec. nov. wings is carbon black or gray-brown, with closely related species complex *T. endymion* (Fr.) - olive-brown or light brown. Both sexes on average smaller (mean length of the ♂ forewing is 9 mm, ♀ - 8.5 mm) than in individuals of similar species (10.5 for ♂♂, and 10 mm in ♀♀). On the upperside of forewing dark margin does not reach the discal cell, while the closely related species of *T. endymion* (Fr.) complex dark border usually reaches the middle of the wing at the discal cell. On the forewing fringe on 2/3 brown, whitish in the apical part, the hind-wing fringe dirty-white, in contrast to the closely related species, which fringe the white or white-gray. On the underside of the *T. mystica* spec. nov. wings basal silvery-blue suffusion is absent, a double row of marginal strokes clear, shared explicit white strip of fused spots. The silvery blue or gray suffusion in basal area of the wings underside is well expressed in the remaining species of the *T. endymion* (Fr.) complex; they also have two marginal series of pale rows that are not separated by lighter bands. Valva in *T. mystica* spec. nov. ♂ genitalia is more rounded and wider in the medial part of the whole bean-shaped, with rounded apex, densely pubescent. On the inside of the distal part of valva are 5-6 weakly significant short thorns that are closer to the apex, of which 3

and 4 cloves of slightly longer than the others. In closely related species complex *T. endymion* (Fr.) valva is thinner and including the medial part, less hairy, with 7-12 distinct, apparent, and big teeth in *T. endymion* (Fr.) (COUTSIS, 2005) and 11-25 distinct in the *T. taygetica* (REBEL, 1902) valva (COUTSIS, 2006). The valva thorns in *T. mystica spec. nov.* are compactly located in one small bulge formation at the distal margin of valva (occupying 1/4 of the distal edge), while in *T. endymion* (Fr.) and *T. taygetica* (REBEL) the teeth are distributed along the length of the distal part of the valva, regardless of their number (fig. 2).

Discussion: According to the last revision (COUTSIS, 2005, 2006), the *Turanana endymion* species-group includes two species that are the closest by their morphological characters to the new species *T. mystica spec. nov.* The first is *T. endymion* (FREYER, [1850]) (= *panagaea* (HERRICH-SCHÄFFER, [1851])) (type locality: 10 km SW of Ladik, Amasya province, Turkey, COUTSIS, 2006) that includes two subspecies: *T. e. endymion* (Fr.) (central and eastern half of Asia Minor, Armenia, Talysh in Azerbaijan, Mazandaran province in Iran, Lebanon and Israel) and *T. e. ahasveros* (BYTINSKY-SALZ & BRANDT, 1937) (Tehran and Fars provinces in Iran) (COUTSIS, 2006; MOHAMMADIAN, 2006; TUZOV et al., 2000). The second species *T. taygetica* (REBEL) (type locality: Mt. Taygetos, Greece) includes three subspecies: *T. t. taygetica* (REBEL) (Taygetos Mts., southern Peloponnesus in Greece), *T. t. endymionoides* COUTSIS, 2005 (Chelmos Mts., northern Peloponnesus) and *T. t. micrasiatica* COUTSIS, 2006 (western half of Asia Minor and the single locality in Central Turkey) (fig. 4).

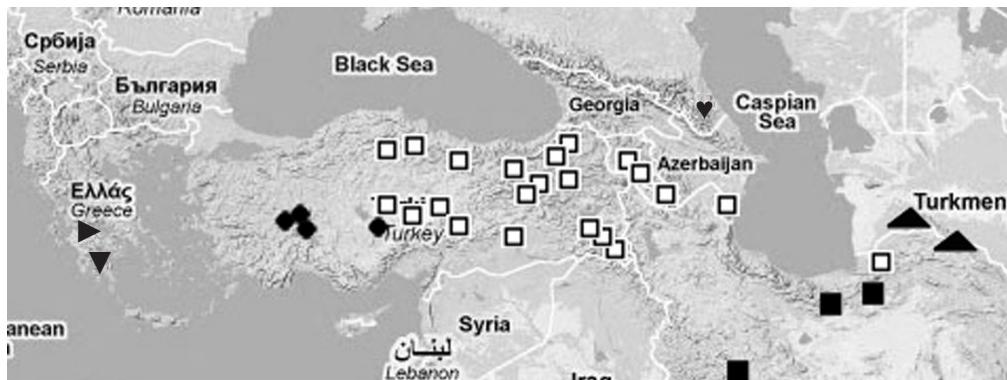


Fig. 4: Map indicating localities of the *Turanana* species based on COUTSIS (2005, 2006, 2007) and original data.

- | | |
|--|---|
| □ - <i>T. endymion endymion</i> (FREYER, [1850]) | ◆ - <i>T. e. ahasveros</i> (BYTINSKY-SALZ & BRANDT, 1937) |
| ♥ - <i>T. mystica spec. nov.</i> | ▼ - <i>T. taygetica taygetica</i> (REBEL, 1902). |
| ● - <i>T. taygetica micrasiatica</i> COUTSIS, 2006 | ► - <i>T. taygetica endymionoides</i> COUTSIS, 2005 |
| ▲ - <i>T. dushak</i> DUBATOLOV, 1989 | |

The separation of *T. taygetica* (REBEL) and *T. endymion* (Fr.) is effected on the basis of small, but constant differences in their ♂ genitalia, the absence of genitalia intermediates, as well as on the basis of syntopism and synchronism of these two species-group taxa in south-central Asiatic Turkey (COUTSIS, 2005). Some authors, e.g. TOLMAN (2008), indicate the genitalia of individuals from northern and southern populations of the Peloponnesus do not differ from each other, although there are significant differences in the structure of the genitalia of specimens from Asia Minor. Close to this complex species *T. dushak* DUBATOLOV, 1989 (type locality is Mt. Dushak, Kopet-Dagh, Turkmenistan) is distributed in Turkmenistan and northern Iran (COUTSIS, 2007).

For the entire Caucasus, previously cited two species of that genus - *T. endymion* (Fr.) and *T. kugitangi* ZHDANKO, 1984 (type locality is Kugitangtau Range, Turkmenistan) (TUZOV et al., 2000). We investigated the following materials of *T. endymion* (Fr.): 4♂, 1♀ («Ordubad, 1.VI.81, 24.5.81, Chr.» - Ordubad, Nakhichevan, Azerbaijan, 1.VI.1881, 24.5.1881, G. CHRISTOPH leg.), 1♂ («Rus. Armen., Erivan, M. Rjabov, 28.VI.1925» - Erevan, Armenia, leg. M. RIABOV; “the hills beyond the Nork” from the other side of the label), 1♂ («Amasia» - Amasya, Turkey), 1♂ (“Lydia” - “panagea”, ZHDANKO A. B. det.), 1♂ (“Asia Minor”, “Ershov’s collection”), 1♀ (“Erivan, upper gorge, 27.VI.1934” - Erevan, Armenia, the collector is not stated) from the collection of ZISP, 2♂ (Armenia, Meghri, May 2006, MORGUN D. V. leg.), 1♂ (Armenia, Khosrov Reserve, Vedi, 24.V.2006, MORGUN D. V. leg.), 1♂ (Armenia, Aiotsdzor Range, near Yelpin, 23.VII.2003, MORGUN D. V. leg.), 1♀ (Azerbaijan, Talysh, July 2003, PLYUSCHTCHE I. G. leg.), 1♂ (Garni, Khosrov res., Azat river, N 40°0'601", E 44°46'47", 1600 m, 11.VI.2010, KRUPITSKY A. V. leg.). According to DIDMANIDZE (1979), *T. endymion* (Fr.) (mentioned as “*T. panagea* HS”) is reported from Khosrov Reserve in Armenia (30.V.1974, from his collectings) and Ordubad, Nakhichevan region of Azerbaijan. Thus, the Caucasian populations of *T. mystica spec. nov.* separated wide geographic span of the known populations of closely related species *T. endymion* (Fr.), distributed about 350 kilometers to the southwest in Khosrov Reserve (Armenia), through several mountain ranges, and about 490 kilometers to the south in Talysh (Azerbaijan).

The main differences of *T. endymion* (Fr.) should be regarded as serrated distal edge of the valva (7-12 big, well-defined teeth), a lighter hue of the upper side of wings in ♂ (pale and pink-violet), light fringe, the absence of an expanded field of purple outwards from the discal cell. This attribute is also the characteristic of *T. taygetica* (REBEL), occurring on mountains Helmos and Taygetos in Greece, as well as in the western regions of Turkey. Specimens of *T. taygetica* (REBEL) differ by lighter background of the upper- and underside of the wings, and less broad dark stripe on the upperside in the ♂. The underside is also lighter, beige-brown, same color on the hindwing and forewing, with a slight bluish basal suffusion, red spot in anal angle of the hind wing. The fringe of the wings is light both above and below (for more on the outer edge of the forewings are dark in *T. mystica spec. nov.*). At the bottom of the forewing the 6th black spot of the submarginal series is not issued inside. A notable difference in the structure of the ♂ genitalia is oblong-oval shape of valva with distinct teeth on the lower edge (up to 12 teeth). In ♂ of *T. taygetica* (REBEL) the valva is broad, oval, with a long number of short sharp spikes coming from the apical part, the bottom prong of the larger remaining (COUTSIS & BORIE, 2007).

From a trophic point of view, *T. endymion* (Fr.) differs by food specialization of the caterpillars on the plants *Acantholimon*,

which absent in the type locality of *T. mystica spec. nov.*

In various parts of the distribution area *T. endymion* (Fr.) and *T. taygetica* (REBEL) occur from 1500 to 2300 m above sea level (TOLMAN, 2008; TUZOV et al., 2000). Specimens of *T. mystica spec. nov.* were found at 450-800 m above sea level.

Significant morphological differences are also from another species known from the Caucasus only by published data, *T. kugitangi* ZHDANKO, 1984 (holotype ♀ from Turkmenistan was studied in ZISP collection; label data «Туркм.ССР, верх. зап. склона Кугитангтау, 3.VIII.1972, С. Реджепалиев» [in Rus.: Turkm. SSR, upper part of Kugitangtau western slope, 3.VIII.1972, S. REDZHEPALIEV]). In *T. kugitangi* ZHDANKO both sexes are brown on upperside, with yellow-brown background underside with mild brown marginal elements. An orange spot in anal angle of the hind wing is almost not expressed. Figure of the underside is not contrast. The fringe is brown. In the ♂ genitalia the valva is narrow, elongated, with one large tooth in the apical part. It inhabits juniper woodlands at altitudes of 2300-2400 m above sea level (ZHDANKO, in TUZOV et al., 2000), that is approximately 1000 m higher than are individuals of the described species.

Close to the complex *T. endymion* (Fr.), the species *T. dushak* DUBATOLOV is characterized by the existence of a single, large ventral tooth on the terminal edge of the valva in ♂ genitalia, the feature which is absent in all other hitherto recognized TURANANA species. We studied 1 ♂, 2 ♀ (paratypes) of *T. dushak* DUBATOLOV (Mt. Dushak, Kopet-Dagh, Turkmenistan) in the collection of ZISP.

By the structure of the ♂ genitalia *T. mystica spec. nov.* is similar to the Central Asian *T. panaegides* (STAUDINGER, 1886) (described from the west of the Ghissar range in Uzbekistan), ♂♂ of which also have rounded valva, do not carry big spines or teeth along the edges, according to ZHDANKO (1984). It was recently shown that the valva distal exhibits ventrally a multi-toothed carinate extension. The teeth are shallow, wide-at-base, weakly serrated and irregular in size and placement (COUTSIS & BORIE, 2007). However, the described species has obvious morphological differences: the valva generally bean-shaped, more elongated and narrower in the apical part; specimens are smaller, the background of the wings on both sides darker, configuration postdiscal series of black spots on the front wing underside sharper. However, further comparative studies of complex traits in species of the genus are required.

The species *T. mystica spec. nov.* of the Mediterranean-Central Asian genus is the northernmost of its representative, an extremely rare, specific element of biodiversity in arid landscapes, the only species of this genus in Russia in need of monitoring and protecting at least at the regional level.

Acknowledgments: We are much indebted to Dr. E. V. ILYINA (Daghestan Biological Museum, Makhachkala, Daghestan Republic) for collecting the ♂ from type series and providing it for the description and A. V. KRUPITSKY (Moscow State University, Moscow) for photographing some specimens.

References

- COUTSIS, J. G. (2005): Revision of the *Turanana endymion* species-group (Lycaenidae). - Nota. lepid. **27** (4): 251-272, Karlsruhe.
- COUTSIS, J. G. (2006): Additional revisionary actions and corrections in the *Turanana endymion* species-group (Lycaenidae). - Nota. lepid. **29** (1/2): 17-25, Karlsruhe.
- COUTSIS, J. G. & J. P. BORIE (2007): *Turanana dushak* new to Iran, a re-description of its valva and of the valva of *Turanana panaegides*, and new sampling locality data for *Turanana endymion endymion* and *Turanana endymion ahaveros* (Lepidoptera: Lycaenidae). - Phegea **35** (2): 57-63, Leefdaal, Belgium.
- DIDMANIDZE, E. A. (1979): Butterflies of the arid parts of Transcaucasia. Some animal groups of the arid parts of Transcaucasia: 43-114 (in Russian). [Дидманидзе Э. А. 1979. Чешуекрылые аридных районов Закавказья // Некоторые группы животных аридных районов Закавказья. С. 43-114]. - Тбилиси.
- LVOVSKY, A. L. & MORGUN, D. V. (2007): Butterflies of Eastern Europe. Moscow (in Russian). [Львовский А. Л., Моргун Д. В. 2007. Булавоусые чешуекрылые Восточной Европы. М.: Т-во научных изданий КМК. 443 с.]. - Moscow.
- MORGUN, D. V. (2004): Two new genera and species of blues (Lepidoptera, Lycaenidae) in Russian fauna. - Russian Entomological Journal **13** (1-2): 96 (in Russian) [Моргун Д. В. 2004. Два новых для фауны России вида и рода голубянок (Lepidoptera: Lycaenidae). - Русск. энтомол. ж. Т. **13** (1-2): 96]. - Moscow.
- TOLMAN, T. (2008): Butterflies of Britain and Europe. Field Guide. - London.
- TUZOV, V. K., BOGDANOV, P. V., CHURKIN, S. V., DANTCHENKO, A. V., DEVYATKIN, A. L., MURZIN, V. S., SAMODUROV, G. D. & A. B. ZHDANKO (2000): Guide to the Butterflies of Russia and Adjacent Territories. Vol. **2**. Libytheidae, Danaidae, Nymphalidae, Riodinidae, Lycaenidae. - Pensoft, Sofia-Moscow.

Addresses of the authors

DMITRY V. MORGUN
Moscow Centre of Ecology and Biology
12a, Odesskaya st.
117303, Moscow, Russian Federation
e-mail: d_moth@mail.ru

VALENTIN V. TIKHONOV
Pyatigorsk Insect Museum
Academic Gallery
357500, Russia, Pyatigorsk
e-mail: entephria@mail.ru